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Characteristics of the 5th (*Abieti-fageta* s.lat.) and 6th (*Picei-fageta* s.lat.) vegetation tiers of the northeastern Moravia and Silesia (Czech Republic)

Charakteristiky 5. jedlo-bukového (*Abieti-fageta* s.lat.) a 6. smrko-bukového (*Picei-fageta* s.lat.) vegetačního stupně severovýchodní Moravy a Slezska (Česká republika)

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Abstract. Detailed characteristics (tree species composition, tree representation, identification features) are presented for the 5th (i.e. geobiocenoses of *Abieti-fageta* s.lat.) and 6th (*Picei-fageta* s.lat.) vegetation tiers in the northeastern Moravia and Silesia. 5th vegetation tier occupies 18.0 % of the study area – from 460 to 920 m a.s.l. *Fagus sylvatica* L. as a dominant species creates the main level and also fills the overtopped level. Significant edificator in the co-dominant level is *Abies alba* Mill. with ecological optimum there and with representation at the all categories of sites up to 40 %. *Picea abies* (L.) Karst. occurs only individually (with the representation up to 10 % on oligotrophic sites, on the eutrophic sites only as an admixture). *Picea abies* can reach the height up to 55 m. 6th vegetation tier occupies 1.1 % of the study area – from 860 m to 1100 m a.s.l. *Fagus sylvatica* as a dominant species creates the main level of stands and it also creates the overtopped tree filling. *Abies alba* and *Picea abies* take significant part in tree species composition. *Abies alba* reaches the main and co-dominant level in the stand structure with representation up to 30 %. *Picea abies*, with its optimum there, reaches co-dominant level. *Picea abies* is represented up to 30-40 %.

INTRODUCTION

Vegetation tiers (further only the VT) are described by ZLATNÍK (1976a) as the ecological superstructure unit of geobiocenological units in relation to climate, which has influence on landscape sections. VTs are determined according to ecological manifestation of differential species combination of sections of „guide" series, where the difference of the climate influence on the composition of tree and undergrowth synusia is minimally disrupted by local absence of water, or on the contrary, other than atmospheric water.

The following tree species are the carriers of vegetation tiers in the Czech Republic (and also in central Europe): sessile oak (*Quercus petraea* (Mattuschka) Liebl.)), English oak (*Quercus robur* L.), European beech (*Fagus sylvatica* L.), silver fir (*Abies alba* Mill.), Norway spruce (*Picea abies* (L.) Karst.) and dwarf pine (*Pinus mugo* Turra). VTs were named according to these tree species by reason of dominance in certain zones.

Any detailed characteristics including determination characters still have not been processed (cf. PLÍVA 1971, 1991; VIEWEGH 2003; VIEWEGH et al. 2003). BUČEK & LACINA (1999) published detailed characteristics of the VT which include a biogeographical frame and occurrence, ecotype features, and a description of the biocenosis state. Detailed characteristics with a description of geobiocenosis natural state (occurrence of plant species, occurrence of tree species and relationship to geobotanical units) were published by BUČEK et al. (2005).

Present work is related to previous work (HOLUŠA & HOLUŠA 2008), there were presented detailed characteristics of the 3rd (i.e. communities of *Querci-fageta* s.lat.) and of the 4th (i.e. communities of *Fageta* (*abietis*) s.lat.) vegetation tiers. The aim of the article is to bring out detailed characteristics of the 5th and 6th vegetation tiers with respect to the occurrence, representation and life status of tree species, as main edificators.

STUDY AREA

The study area lies in the northeastern Moravia and Silesia (i.e. the very eastern part of the Czech Republic (Fig. 1). Detailed determination of the study area is specified in the work by HOLUŠA & HOLUŠA (2008) Study area includes, according to the division of Natural forest areas (further only the NFA) (PLÍVA & ŽLÁBEK 1986), the following Natural forest areas: the whole territory of the NFA 39 the Podbeskydská pahorkatina Hillyland, the NFA 40 the Moravskoslezské Beskydy Mts. and a predominant part of the NFA 32 Slezská nížina Lowland (except the region of Vidnava town), further the following parts of these NFAs: eastern half of the NFA 29 Nízký Jeseník Hillyland and the eastern half of the NFA 41 the Hostýnsko-vsetínské vrchy Hills and the Javorníky Mts., eastern part of the NFA 28 the Foreland Hrubého Jeseníku Mts., and then only a small northern part of the NFA 37 Kelečská pahorkatina Hillyland and the very eastern hook of the NFA 34 Hornomoravský úval Dale. The very western part of the study area slightly penetrates into the NFA 27 Hrubý Jeseník Mts.

The study area comprises the following subprovincies with respect to the biogeographical division (CULEK 1996): Hercynic subprovincy (i.e. the NFAs 28, 27, 29), Polonic subprovincy (i.e. the NFAs 32, 39) and West-Carpathian subprovincy (i.e. the NFAs 39, 40 and 41).

The study area has the lowest point in the lowland of the Odra river at elevation of 193 m a.s.l. – i.e. the point where the Odra river leaves the territory of the Czech Republic. The alluvium of the Odra river is easternwards followed by flat hills that change into uplands and later highlands of the Moravskoslezské Beskydy Mts. with the hightest point – the peak of Lysá hora Mt. (1328.4 m a.s.l.). The alluvium of the Odra river is easternwards followed by flat hills that change into uplands and later highlands of the Hrubý Jeseník Mts. with the highest point of the study area in this part – the peak of Medvědí vrch Mt. (1216.0 m a.s.l.).

MATERIAL AND METHODS

Forest-site classification system was used for classification of ecological conditions of geobiocenoses. It is used in the forest practice in the Czech Republic (PLÍVA 1971, 1991).

The records were found by the authors´ own forest-typological classification mappings in the study area during the period 1971-2002. Forest-typological classification mappings in the study area including the vegetation tiers determination were done by the authors in the frame of Forest management plans recovery of individual Management-plan areas, later by field examination of natural conditions within Regional plans for forest development.

In the geobiocenological research 220 phytosociological relevés were surveyed in every MPA. After year 1981 cca 20 geobiocenological areas (per cca. 20,000 ha) were revised there. This methodology was used within the frame of field mapping of Regional plans of forest development. Phytosociological relevés were revised on the geobiocenological plots with a square of 20x20 m. The most well-preserved geobiocenoses were in focus in the study (i.e. the level of naturalness 1 or 2 according to ELLENBERG (1973, 1978). Transects with the size of 10x60 m were set out for the description of the forest stand structure at the most well-preserved plots, data at transect were measured by yardstick. Dendrological measurements were made on the plots, with regard to the highest trees. Photos were taken in some representative geobiocenoses during the vegetation period. Phytosociological relevés were elaborated using the SW Turboweg for Windows and evaluated using the SW Juice, version 6.5.

The plant species were sorted into vegetation bands according to ZLATNÍK (1959) and added according to AMBROS & ŠTYKAR (2001) for evaluation of vegetation band representatives in the interpretation of SCHMIDT (1939, 1949). The following abbreviations are used for vegetation bands: *QTA – Quercus-Tilia-Acer, QRC – Quercus robur-Calluna, FA – Fagus-Abies, P – Picea* and *LPC – Larix-Pinus cembra*. The nomenclature of plant and tree species is used according to KUBÁT et al. (2002). The climatical characteristics are defined according to TOLASZ (2007). The classification of soil types and subtypes is used according to NEMEČEK et al. (2001).

5th Vegetation tier – *Abieti-fageta* s.lat. – fir-beech

The composition and structure of geobiocenoses: *Fagus sylvatica* L. is dominant there, it creates the main level and also fills the overtopped level (Fig. 5). Trees of *F. sylvatica* can reach the height cca 47-48 m, maximum measured height was 47 m (cadastral territory (further c.t.) of Bílá – National Nature Reserve (further NNR) Salajka). PRŮŠA & HOLUŠA (1976) described the height 45 m in the Moravskoslezské Beskydy Mts. in the NNR Razula (c.t. Velké Karlovice). RAMBOUSEK (1990) characterizes *F. sylvatica* in the 5th VT as a mountain climatype with above average values of features (regularity of trunk cross-section, length of crown, trunk rightness, trunk sinuosity, pyramidal shape of crown, weaker branches, straight trunks) and he writes, that straight trunks are more than 30 % (i.e. identification sign of climatype). Significant edificator is *Abies alba* Mill. there, it has its optimum there and it has representation in the eutrophic and also in oligotrophic categories of sites up to 40 %. Its height reaches the co-dominant level (up to 55 m), at present specimens with the height of 51 m (Salajka (Fig. 5, 7) were found; PRŮŠA (1985) writes about maximum height specimen of *A. alba* reaching 50 m, in the NNR Razula (PRŮŠA & HOLUŠA 1976) the maximum measured height was 54 m). *Picea abies* (L.) Karsten occurs only individually (it is documented in natural forest stands in the NNR Razula, Salajka and also in the NNR Mazák (c.t. Ostravice) in the Moravskoslezské Beskydy Mts.). PRŮŠA & HOLUŠA (1976) describe the representation of *P. abies* reaching 10 % in the NNR Razula, PRŮŠA (1985) writes about a part of original *P. abies* 8 % in the Salajka NNR. PLÍVA (1991) supposes the representation up to 10 % on oligotrophic sites and only as an admixture on the eutrophic sites. *P. abies* can reach the height up to 55 m in the 5th VT (at present, the highest specimen in the NNR Salajka reaches 54 m. PRŮŠA (1985) published the maximum height of 44 m, in the NNR Razula. PRŮŠA & HOLUŠA (1976) describe maximum height of 52 m. The authors of this article have measured the maximum height of 54 m in the NNR Mazák. *Acer pseudoplatanus* L. and *Ulmus scabra* Huds. occur as additional tree species, which reach main level only rarely. They occur mostly in the overtopped level. They increase their representation in the debris sites. There are *Tilia cordata* Miller (sites up to 950 m a.s.l.), *T. platyphyllos* Scop. (up to 730 m a.s.l.), *Acer platanoides* L. (up to 750 m a.s.l.) and also *Prunus avium* (L.) L. (up to 800 m n. m.) as individual addition (generally in the overtopped level). The occurrence of these species ends in the 5th VT, they do not occur in higher VTs. According to BUČEK & LACINA (1999) the occurrence of *Ulmus scabra* also ends there. In the 5th VT *Taxus baccata* L. can occur in the overtopped level, and also specimens of *Sorbus aucuparia* L. can occur in the advanced geobiocenoses in the overtopped level. Shrubs are represented by the following species – *Sambucus nigra* L. (its occurrence ends in the 5th VT), *S. racemosa* L., locally *Lonicera nigra* L., *Daphne mezereum* L., *Ribes alpinum* L., individually *Crataegus laevigata* (Poiret) DC. (up to 900 m n.m.) and *C. praemonticola* Holub (up to 810 m n.m.) reach into the 5th VT . *Salix silesiaca* Willd. can already occur individually. BUČEK & LACINA (1999) write about the occurrence of *Rosa pendulina* L. for the shrub layer.

Differential features: 5th VT differs from lower VTs by the absence of *Quercus* sp. (*Q. petraea* (Mattuschka) Liebl., *Q. robur* L.); concerning the occurrence of *Quercus* sp. there – there are only planted specimens. They have limited growth suffering from frost, their branches and trunks are very often covered by layers of lichen. *Carpinus betulus* L. is absolutely missing. Specimens of *Fagus sylvatica* show lower trunk sinuosity, forest stands of *F. sylvatica* have few co-dominant specimens – structure of stands is well-balanced.

Picea abies regenerates only very rarely, namely on open mineral soil (in the natural conditions only on root balls of windthrows). Submontane species, e.g. *Luzula sylvatica* (Huds.) Gaudin and *Gentiana asclepiadea* L. are regularly present in the undergrowth. The undergrowth includes a combination of central European deciduous forest species and submontane and montane species. There are, with higher representation, the following species – *Senecio ovatus* (G., M. et Sch.) Willd., *Oxalis acetosella* L., *Galium odoratum* (L.) Scop., *Rubus hirtus* W. et K., *R. idaeus L.*, *Athyrium filix-femina* (L.) Roth, and *Dryopteris filix-mas* (L) Schott and also species, which are typical of higher VTs – *Prenanthes purpurea L.*, *Calamagrostis villosa* (Chaix) J. F. Gmelin, *Luzula sylvatica* and *Gentiana asclepiadea*.

Plant species of the *FA* vegetation band are predominant, in contrast to the 4th vegetation tier there are only rare representives of the *QTA* vegetation band or representatives belonging to two vegetation bands – the *FA (QTA)* vegetation bands. Species of *LPC*, *P* vegetation bands are represented with same share. Species belonging to more vegetation bands – *FA (P, LPC), P* and *LPC* occur individually. AMBROS (1991a) writes about the greatest concentration of species of *FA* vegetation band with addition of species of *P* vegetation band which is more numerous than the species of *QTA* vegetation band.

Character of ecotope: Areas with the 5th VT can be characterized as higher uplands and parts of mountains (Fig. 3). 5th VT occurs in the altitude from 460 to 920 m a.s.l. with the centre of occurrence in the interval of 640-660 m a.s.l., locally up to 950 m a.s.l. BUČEK & LACINA (1999) published the regular occurrence from 600 to 800 m a.s.l. with individual occurrence already at 500 m and also at 900 m a.s.l. Soil types were created on the flysh series of rocks of sandstones, claystones and shales, sporadically on deluvial loams in the Carpathians Mts. and gneisses, schists, phyllites in the Hrubý Jeseník Mts. Cambisols are prevailing as the soil type (subtypes typical, eutrophic, solitary dystrophic, luvic and pseudogleyic), fewer then there are podsols (cambic, typical), rankers occur sporadically there.

The territory of the 5th VT belongs to MW1 and C6 climatical regions with the following characteristics: mean January temperature of -4 to -6°C, mean July temperature of 14-16°C, sum of precipitation in the vegetation period of 300-500 mm, sum of precipitation in the winter period of 100-140 mm, number of days with mean temperature 10°C and more of 120-140 days.

Occurrence: 5th VT occupies large areas in the NFA 40 and 41 (Fig. 1, 9, 10). It fills 18 % of the study area. There are the following most widespread communities (units according to system of PLÍVA 1971, 1991): forest site type complexes (further FTC) 5B (*Abieto-Fagetum eutrophicum*), FTC 5S (*Abieto-Fagetum mesotrophicum*), 5D (*Fagetum acerosum deluvium*) and 5A (*Acereto-Fagetum lapidosum*). Latin names of FTC according to MIKESKA & KUSBACH (2000). BUČEK & LACINA (1999) write about large-scale occurrence in Moravia and Silesia: region of Králický Sněžník Mts., Hrubý Jeseník Mts., Českomoravská and Drahanská vrchovina Highlands, Zábřežská vrchovina Highlands and Nízký Jeseník Hillyland, in the Carpathian region, 5th VT prevails in the Moravskoslezské Beskydy Mts. (i.e. the NFA 40), Hostýnsko-vsetínské vrchy Hills and Javorníky Mts. (i.e. the NFA 41), and also in the northern part of the Bílé Karpaty Mts. Those authors hold the 5th VT as the second most widespread VT in the Czech Republic (it occupies 22 % of its territory). KRIŽOVÁ (2000) writes about its occurrence at 20.79 % in Slovakia.

MÍCHAL (1988) considers orohemiboreal of the 5th VT as a very distant analogy of zonoecotone of coniferous-broadleaf forests in the conception of sorting by WALTER (1979). It is possible to admit the hypothesis that the 5th VT could belong to the zonobiome

of temperate deciduous broadleaved forests of the moderate band with respect to areas of *Fagus sylvatica* and *Abies alba*.

Present condition of forest geobiocenoses: Greater part of the 5th VT area was changed to monoculture or stands with dominance of *Picea abies*. *Abies alba* and other tree species are mostly missing also in stands of *Fagus sylvatica*. *A. alba* is represented relatively commonly only in the NFA 41 (mostly within the Czech Republic). The NNR Salajka is characterized by PRŮŠA (1985) as the most well-preserved virgin forest of the 5th VT both with tree species composition and spatial structure. With high probability there are the most well-preserved geobiocenoses in the whole Czech Republic. Forest geobiocenoses in the NNR Salajka are described by VIEWEGH (1994) with decrement of species in the undergrowth, and he writes about "shift" to the higher moisture. In total, he characterizes the tree layer as thinning resulting in opening the undergrowth and making it thus lighter. He comments the stand structure condition as a decrease of representation of *A. alba* and *P. abies*, the stadium of disintegration is in process when the conifers are exchanged by broad-leaf trees. Natural geobiocenoses, but only in a small scale, are represented in the NNR Mazák (HOLUŠA & HOLUŠA 2003) and the NNR Mionší (c.t. Horní Lomná, Dolní Lomná) in the Moravskoslezské Beskydy Mts. and in the NNR Razula. However, in the above locations, the tree species composition has been largely changed – in favour of *F. sylvatica*, any advance growth and recruits of *A. alba* are missing (PRŮŠA & HOLUŠA 1976).

6th Vegetation tier – *Picei-fageta* s.lat. – spruce-beech

The composition and structure of geobiocenoses: *Fagus sylvatica* is dominant in the tree species composition, it creates the main level of stands, it reaches the maximum height of cca 32-33 m. *F. sylvatica* creates also the overtopped tree filling. RAMBOUSEK (1990) characterizes *F. sylvatica* in the 6th VT (likewise in the 5th VT) as a mountain climatype with distinct representation of running trunks (more than 30 % – i.e. identification feature of this climatype). *Abies alba* and *Picea abies* significantly take part in tree species composition (Fig. 6). *A. alba* reaches in the height structure to the main and co-dominant level with the height up to 40 m (maximum measured height was 36 m) and its representation in natural geobiocenoses is up to 30 %. *Picea abies*, which has its optimum in the 6th VT, reaches the co-dominant level and then the highest heights (with maximum 55 m, recent maximum measured height was 45 m). *P. abies* is represented up to 30 % on eutrophic sites, 40 % on the oligotrophic sites (PLÍVA 1991). *Acer pseudoplatanus*, which occurs only as additional tree species, reaches only the overtopped level. *Taxus baccata* and *Sorbus aucuparia* occur individually in the overtopped level. There are the following representatives: *Sambucus racemosa*, *Lonicera nigra*, *Ribes alpinum*, and *Salix silesiaca*, and according to BUČEK & LACINA (1999) also *Rosa pendulina* in the layer of shrubs.

Differential features: *Fagus sylvatica* creates the main level of stands, it reaches only up to 30 m. *Picea abies* has very good conditions for natural regeneration, and its regeneration is very common. In the undergrowth, some submontane and montane plant species – *Athyrium distentifolium* Opiz, the high continuous stands of *Vaccinium myrtillus* L. – shrublets, and more continual canopy of *Luzula sylvatica* are dominant there .

There is a relatively common occurrence of species of central-European deciduous forest – e.g. *Oxalis acetosella* L., *Galium odoratum*, *Rubus hirtus*, with higher share there are submontane and montane species – *Athyrium distentifolium*, *Vaccinium myrtillus*, *Luzula sylvatica*, and *Gentiana asclepiadea*, more common is *Calamagrostis villosa*, and *Homogyne alpine* (L.) Cass. can occur there.

The number of plant species of the *FA* vegetation band is significantly lower, but they still create a dominant part of the undergrowth, species belonging to two vegetation bands *FA (QTA)* occur there only individually. Species of *LPC* vegetation band and species belonging to two vegetation bands – *LPC, P* are more frequent. There is only an individual occurrence of species belonging to more vegetation bands – *FA (P, LPC),* and with the same share, species of *P* vegetation band are represented there.

Character of ecotope: 6th VT occupies higher parts of mountains (Fig. 2, 9), in places with altitude from 860 m a.s.l. to 1100 m a.s.l. with the centre of occurrence in the interval of 920-940 m a.s.l. (Fig. 4). According to BUČEK & LACINA (1999) it occurs in the interval of 900-1200 m a.s.l., but the 6th VT in the geobiocenological system (ZLATNÍK 1976a, b; BUČEK & LACINA 1999) includes the 6th and also the 7th VT in the conception of forest-typological system (PLÍVA 1971, 1991). Therefore it is possible to compare only the "lower" border of the VT. Soils arose on the flysh series of rocks of sandstones and shales, insular on the deluvial loams in the Carpathians Mts. and gneisses, schists, phyllites in the Hrubý Jeseník Mts. There are represented the following soil types: cambisols (subtypes typical, individually pseudogleyic), podzols (typical, humic), partially rankers.

The territory of the 6th VT belongs to the C4 and C6 climatical regions with the following characteristics: mean January temperature of -4 to -7°C, mean July temperature of 12-15°C, sum of precipitation in the vegetation period of 600-700 mm, sum of precipitation in the winter period of 400-500 mm (horizontal atmospheric precipitation often occur), number of days with mean temperature 10°C and more of 80-140 days.

Occurrence: 6th VT occurs in a relatively higher scale only in the NFA 40, only individually in the NFA 41 (see Fig. 2). It occupies 1.1 % of the study area. It has, in contrast to the 5th VT, significantly lower representation. There are the following most widespread communities (units according to the system of PLÍVA 1971, 1991): FTC 6S (*Piceeto-Fagetum mesotrophicum*), FTC 6F (*Piceeto-Fagetum fastigiosum lapidosum mesotrophicum*)) and FTC 6B (*Piceeto-Fagetum eutrophicum*). BUČEK & LACINA (1999) note the total occurrence of the 6th VT (but the 6th VT in the conception of geobiocenological system) in 3 % of the territory of the Czech Republic, in Moravia and Silesia it is widespread only in the frontier mountains – the Králický Sněžník Mts., the Hrubý Jeseník Mts. and the Moravskoslezské Beskydy Mts. For the territory of Slovakia, KRIŽOVÁ (2000) writes about the occurrence at the 9.37 % of Slovak area (also according to the geobiocenological system). MÍCHAL (1988) characterizes the 6th VT as analogy of oroboreal (lower) suborobiome to the zonobiome of boreal coniferous forests (southern taiga – i.e. broadleaf-coniferous) in the conception of sorting by WALTER (1979).

Present state of forest geobiocenoses: The territory of the 6th VT is an area, in which any large deforestation was not done. Geobiocenoses were partly changed to monoculture or stands with dominance of *Picea abies*, or tree species composition was changed in favour of *Fagus sylvatica*. The representation of *Abies alba* was significantly decreased, *A. alba* at present occurs only individually. In the places of the 6th VT the original ecotype of "Beskidian" *P. abies* (HOLUŠA & HOLUŠA 2001) has been relatively conserved as far as the number is concerned. Natural geobiocenoses are represented in the NNR Mazák. VIEWEGH (1994) characterizes the state of those geobiocenoses (in the former State protected reserve Pod Lysou horou) as stands with a strong opening of the undergrowth and with the tendency to disintegration of the tree layer. Natural and close to nature forest stands are conserved in the Nature Reserve of Smrk Mt. (HOLUŠA & HOLUŠA 2001), and they are also individually occurring on the massif of Travný Mt. (c.t. Krásná), and in the higher parts of the NNR Mionší.

CONCLUSION AND SUMMARY

Vegetation tiers represent basic superstructure units of the forest-typological (or geobiocenological) classification systems. VTs are marked according to ecological manifestation of differential species combination in sections of „guide" series, they are determined by differentiation species (at first place tree or shrub determinants!) of the main level synusia of natural forest and shrub geobiocenoses and by chtonophytes (vascular plants).

5th VT represents the geobiocenoses of *Abieti-fageta* s.lat., it occupies 18.0 % of the study area – from 460 to 920 m a.s.l., with the centre of occurrence in the interval of 640-660 m a.s.l. *Fagus sylvatica* is dominant there with the height of cca 47-48 m, it creates the main level and also fills the overtopped level. *Fagus sylvatica* in the 5th VT is characterized as a mountain climatype. Significant edificatory is *Abies alba* there, it has its optimum there and it has the representation at all the categories of sites up to 40 %, and it reaches the co-dominant level (its height up to 55 m). *Picea abies* occurs only individually (with the representation up to 10 % at oligotrophic sites, at the eutrophic sites only as an admixture). *Picea abies* can reach the height up to 55 m. *Acer pseudoplatanus, A. platanoides*, *Tilia cordata, T. platyphyllos*, *Cerasus avium* and *Ulmus scabra* occur as additional tree species, which reach the main level only rarely. They occur mostly in the overtopped level. The occurrence of *Tilia cordata*, *T. platyphyllos*, *Acer platanoides* and also *Cerasus avium* ends in the 5th VT, they do not occur in higher VTs. In the 5th VT *Taxus baccata* and *Sorbus aucuparia* can occur in the overtopped level. Shrubs are represented by the following species – *Sambucus nigra*, *S. racemosa*, locally *Lonicera nigra*, *Daphne mezereum*, *Ribes alpinum*, individually *Crataegus laevigata, C. praemonticola* and *Salix silesiaca*. BUČEK & LACINA (1999) write about the occurrence of *Rosa pendulina* for the shrub layer.

6th VT represents the geobiocenoses of *Picei-Fageta* s.lat., it occupies 1.1 % of the study area – from 860 m a.s.l. to 1100 m a.s.l., with the centre of occurrence in the interval of 920-940 m a.s.l. *Fagus sylvatica* creates the main level of stands (the maximum height cca 32-33 m) and it is a dominant species in the tree species composition there. *Fagus sylvatica* creates also the overtopped tree filling and it is characterized as a mountain climatype. *Abies alba* and *Picea abies* are very frequent in the tree species composition. *Abies alba* reaches, in the stand structure, to the main and co-dominant level with the height up to 40 m and with representation up to 30 %. *Picea abies*, with its optimum there, reaches the co-dominant level with maximum height of 55 m. *Picea abies* is represented up to 30-40 %. *Acer pseudoplatanus*, *Taxus baccata* and *Sorbus aucuparia,* which occur only as additional tree species, reach only the overtopped level. *Sambucus racemosa*, *Lonicera nigra*, *Ribes alpinum*, *Salix silesiaca* and *Rosa pendulina* represent the layer of shrubs.

The presented characteristics is a continuation of the previous work of HOLUŠA & HOLUŠA (2008), where the 3rd (i.e. geobiocenoses of *Querci-fageta* s.lat.) and the 4th vegetation tiers (i.e. geobiocenoses of *Fageta abietis* s.lat.) were characterized. All characteristics have been drawn up on the base of the records from Hercynic, Polonic and West-Carpathian biogeographical subprovinces, i.e. the study area involves all significant biogeographical regions of the Czech Republic with an extensive representation of forests.

Geobiocenoses of the 3rd VT (i.e. geobiocenoses *Querci-fageta* s.lat.), the 4th VT (i.e. geobiocenoses of *Fageta abietis* s.lat.), the 5th VT (i.e. geobiocenoses of *Abieti-fageta* s.lat.) and up to the 6th VT (i.e. geobiocenoses of *Picei-fageta* s.lat.) represent the communities of "Beechwood sensu lato" (i.e. *Fageta* s.lat.), it means that the communities of *Fageta* with representation of 99.9 % of the study area are a highly dominant vegetation community in this territory. The authors express the opinion, that the 5th VT could belong

to the zonobiome of temperate deciduous broadleaved forests of the moderate band with respect to areas of *Fagus sylvatica* and *Abies alba* dominant occurrence. They both also agree that the 6th VT represents the analogy of oroboreal (lower) suborobiome to the zonobiome of boreal coniferous forests (southern taiga – i.e. broadleaf-coniferous) in the conception of sorting by WALTER (1979).

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SOUHRN

V této studii jsou prezentovány detailní charakteristiky (dřevinné druhové složení, porostní struktura, determinační znaky) pro 5. jedlo-bukový (tj. geobiocenózy *Abieti-fageta* s.lat.) a 6. smrko-bukový (geobiocenózy *Picei-fageta* s.lat.) vegetační stupně z oblasti severovýchodní Moravy a Slezska. 5. vegetační stupeň je zastoupen na 18,0 % studované oblasti – od nadmořské výšky 460 po 920 m. Dominantní dřevinou je zde *Fagus sylvatica*, který vytváří hlavní úroveň a výplňovou podúroveň. Významným edifikátorem v nadúrovni je *Abies alba*, která zde má ekologické optimum, dosahuje zastoupení až 40 %. *Picea abies* se zde vyskytuje jednotlivě (se zastoupením maximálně do 10 % na oligotrofních stanovištích, na eutrofních stanovištích pouze jednotlivě jako příměs). *Picea abies* může dosahovat v nadúrovni až 55 m. 6. vegetační stupeň se v zájmové oblasti vyskytuje na 1,1 % rozlohy – od nadmořské výšky 860 m po 1100 m. *Fagus sylvatica* je zde zastoupen jako dominantní druh, který vytváří hlavní úroveň a podúrovňovou výplň. *Abies alba* a *Picea abies* jsou významnými edifikátory v druhovém složení. *Abies alba* dosahuje v porostní výstavbě nadúrovně a úrovně se zastoupením až do 30 %. *Picea abies*, který zde má své optimum, dosahuje nadúrovně se zastoupením 30-40 %.

Vegetačním stupněm se rozumí ekologická nadstavbová jednotka geobiocenologických jednotek ve vztahu ke klimatu uplatňujícího se na segmentech v krajinných celcích. Jsou vymezovány podle ekologického projevu diferenciální druhové kombinace segmentů „vůdčích“ řad. Vegetační stupně jsou určeny diferenciačními druhy, kterými jsou na prvním místě stromovité, popř. křovité determinanty synuzie hlavní úrovně původních lesních a křovitých biocenóz a vůbec chtonofyty, reagující rozhodným způsobem na délku vegetační doby a na negativní jevy klimatu (ZLATNÍK 1976a).

Charakteristiky uvedené v této práci jsou vyhotoveny pro oblasti východního Hercynika, Polonika a západních Karpat na území České republiky, tj. studovaná oblast zahrnuje všechny významné biogeografické oblasti ČR s dostatečným zastoupením lesů. Navazují na předcházející práci HOLUŠA & HOLUŠA (2008), kde byly charakterizovány 3. dubo-bukový (tj. geobiocenózy *Querci-fageta* s.lat.) a 4. bukový (tj. geobiocenózy *Fageta abietis* s.lat.) vegetační stupeň V 5.VS kromě již uvedených hlavních edifikátorů se vyskytuje *Acer pseudoplatanus*, *A. platanoides*, *Tilia cordata*, *T. platyphyllos, Cerasus avium* a *Ulmus scabra* jako příměsové druhy, které dosahují v porostní výstavbě pouze vzácně úrovně. Většinou jsou zastoupeny již v podúrovni. Výskyt *Tilia cordata*, *T. platyphyllos*, *Acer platanoides* a také *Cerasus avium* končí v 5.VS, ve vyšších VS se již nevyskytují. V podúrovni 5.VS se také vyskytují *Taxus baccata* a *Sorbus aucuparia*. V keřovém patře jsou zastoupeny druhy – *Sambucus nigra*, *S. racemosa*, místně *Lonicera nigra*, *Daphne mezereum*, *Ribes alpinum*, jednotlivě *Crataegus laevigata*, *C. praemonticola*

a *Salix silesiaca*. BUČEK & LACINA (1999) uvádějí ještě výskyt *Rosa pendulina*. V 6.VS kromě již uvedených hlavních edifikátorů se v úrovni vyskytují i *Acer pseudoplatanus*, *Taxus baccata* a *Sorbus aucuparia,* které se vyskytují jen jednotlivě a dosahují pouze podúrovně. *Sambucus racemosa*, *Lonicera nigra*, *Ribes alpinum*, *Salix silesiaca* a *Rosa pendulina* reprezentují keřové patro.

Geobiocenózy 3. dubo-bukového (tj. geobiocenózy *Querci-fageta* s.lat.), 4. bukového (tj. geobiocenózy *Fageta abietis* s.lat.), 5. jedlo-bukového (tj. geobiocenózy *Abieti-fageta* s.lat.) a až po 6. smrko-bukový (tj. geobiocenózy *Picei-fageta* s.lat.) reprezentují společenstva bučin sensu lato (tj. *Fageta* s.lat.), tzn. že společenstva bučin (*Fageta* s.lat.) s rozlohou 99,9 % zájmového území, jsou zcela zřetelně dominantním společenstvem. Autoři se domnívají, že 5.VS náleží ještě k zonobiomu temperátních opadavých listnatých lesů mírného pásu s ohledem na dominantní výskyt *Fagus sylvatica* a *Abies alba*. Souhlasí rovněž, že 6.VS představuje analogii oroboreálního (dolního) suborobiomu k zonobiomu boreální jehličnaté lesy (jižní tajgy – listnato-jehličnaté) ve smyslu třídění WALTERA (1979).

Fig. 1. Spread of the 5th vegetation tier (*Abieti-fageta* s.lat.) in the study area (azonal geobiocenoses of flood plains are not marked in the frame of the territory of the VT; lines A-A´, B-B´ represent positions of profiles, Fig. 9, 10)

Obr. 1. Rozšíření 5. vegetačního stupně (*Abieti-fageta* s.lat.) na studovaném území (azonální geobiocenózy lužních lesů nejsou v rámci teritoria vegetačních stupňů vyznačeny; linie A-A´, B-B´představují pozici profilů, obr. 9, 10)

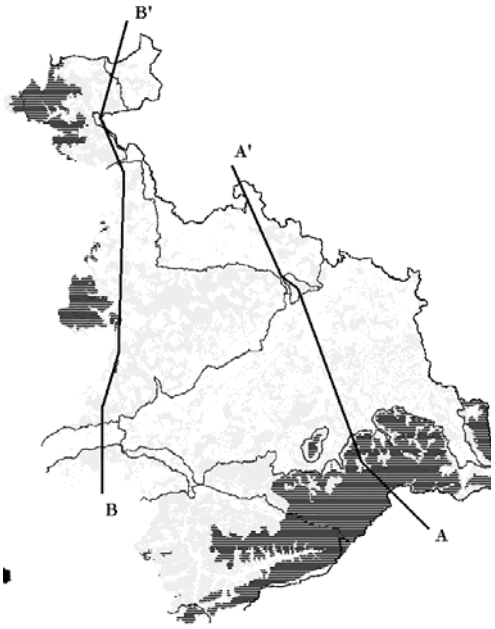

Fig. 2. Spread of the 6th vegetation tier (*Picei-fageta* s.lat.) in the study area (azonal communities of flood plains are not marked in the frame of the territory of the VT)

Obr. 2. Rozšíření 6. vegetačního stupně (*Picei-fageta* s.lat.) na studovaném území (azonální společenstva lužních lesů nejsou v rámci teritoria vegetačních stupňů vyznačeny)

Fig. 3. Graph of the occurrence of the 5th vegetation tier (*Abieti-fageta* s.lat.) in the intervals of the altitude in the study area
Obr. 3. Graf výskytu 5. vegetačního stupně (*Abieti-fageta* s.lat.) podle nadmořské výšky studovaného území

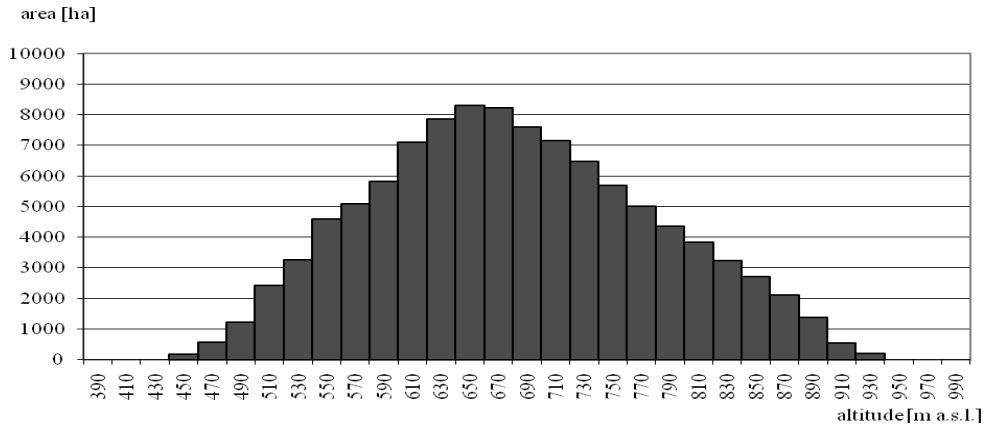

Fig. 4. Graph of the occurrence of the 6th vegetation tier (*Picei-fageta* s.lat.) in the intervals of the altitude in the study area
Obr. 4. Graf výskytu 6. vegetačního stupně (*Picei-fageta* s.lat.) podle nadmořské výšky studovaného území

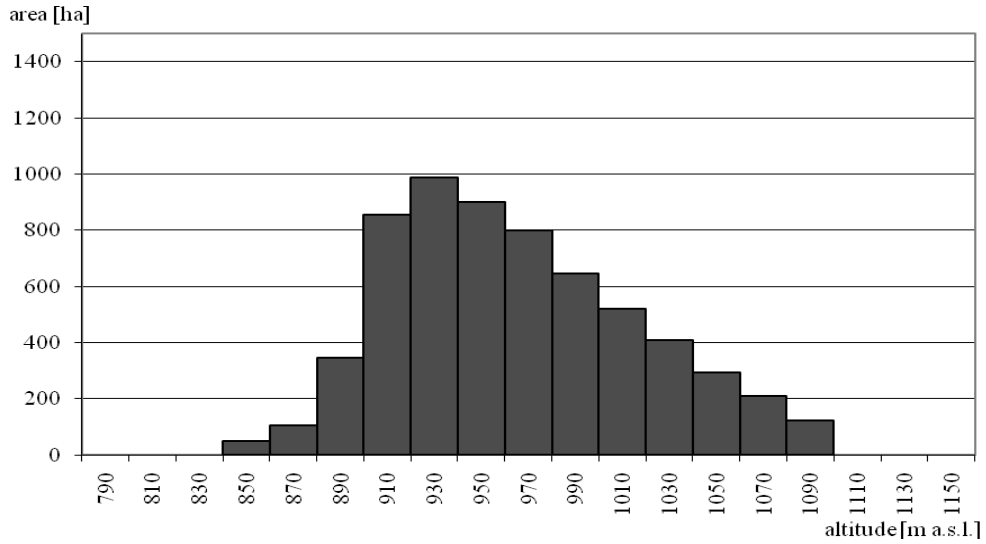

Fig. 5. Transect of the forest stand structure of the 5th vegetation tier (*Abieti-fageta* s.lat.) (locality: the Moravskoslezské Beskydy Mts., c.t. Bílá – the National Nature Reserve Salajka)

Obr. 5. Transekty porostní struktury 5. vegetačního stupně (*Abieti-fageta* s.lat.) (lokalita: Moravskoslezské Beskydy, Bílá – Národní přírodní rezervace Salajka)

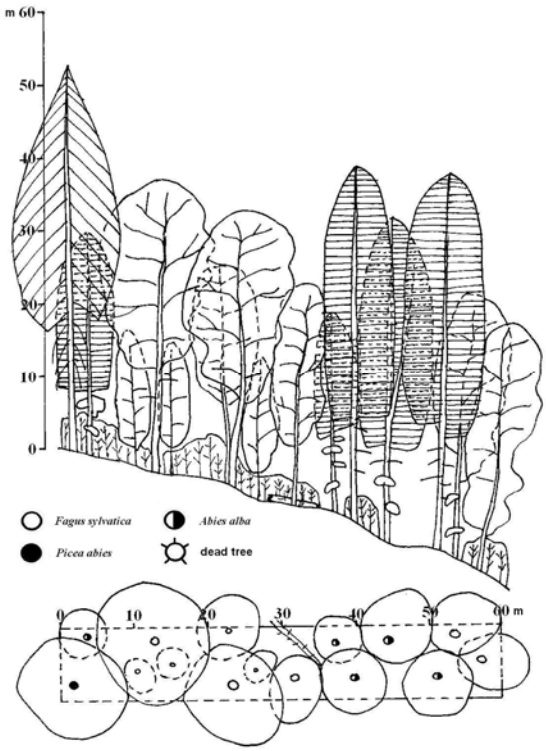

Fig. 6. Transect of forest stand structure of the 6th vegetation tier (*Picei-fageta* s.lat.) (locality: the Moravskoslezské Beskydy Mts., c.t. Staré Hamry – the National Nature Reserve Mazák)

Obr. 6. Transekty porostní struktury 6. vegetačního stupně (*Picei-fageta* s.lat.) (lokalita: Moravskoslezské Beskydy, Staré Hamry – Národní přírodní rezervace Mazák)

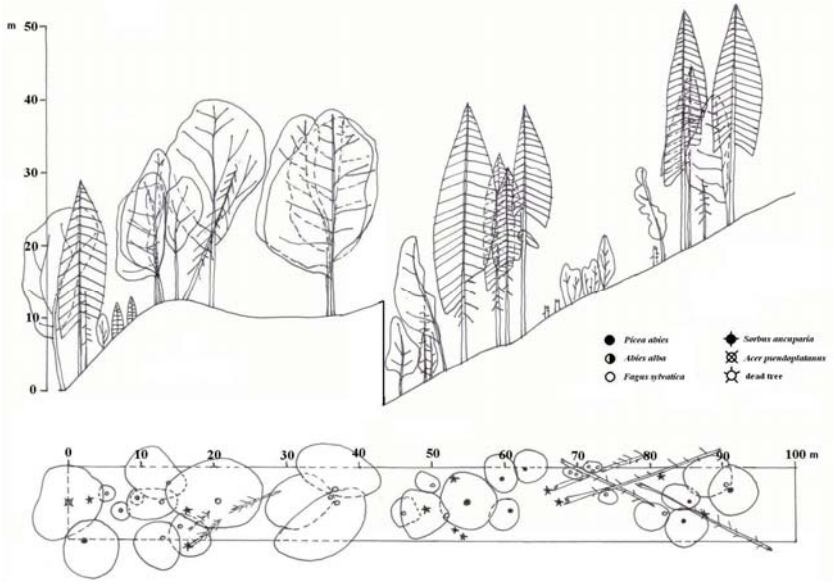

Fig. 7. Demonstration of natural geobiocenosis of the 5th vegetation tier (*Abieti-fageta* s.lat.) (locality: the Moravskoslezské Beskydy Mts., c.t. Bílá – the National Nature Reserve Salajka, 795 m a. s. l.)

Obr. 7. Přirozená geobiocenóza 5. vegetačního stupně (*Abieti-fageta* s.lat.) (lokalita: Moravskoslezské Beskydy, Bílá – Národní přírodní rezervace Salajka, 795 m n.m.)

Fig. 8. Demonstration of natural geobiocenosis of the 6th vegetation tier (*Picei-fageta* s.lat.) (locality: the Moravskoslezské Beskydy Mts., c.t. Čeladná – the National Nature Reserve Kněhyně-Čertův mlýn, 1070 m a. s. l.)

Obr. 8. Přirozená geobiocenóza 6. vegetačního stupně (*Picei-fageta* s.lat.) (lokalita: Moravskoslezské Beskydy, Čeladná – Národní přírodní rezervace Kněhyně-Čertův mlýn, 1070 m n.m.)

Fig. 9. Profile in the A-A´ profile terrain in the study area with marked the 5th and the 6th vegetation tiers
Obr. 9. Profil v A-A´ linie studovaného území s vyznačením 5. a 6. vegetačního stupně

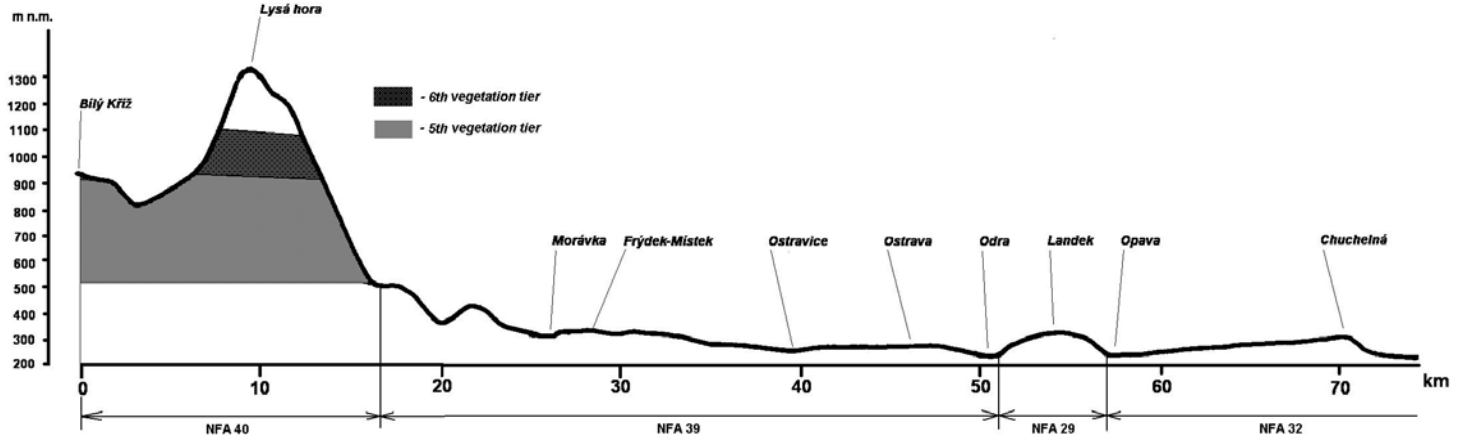

Fig. 10. Profile in the B-B´ profile terrain in the study area with marked the 5th vegetation tiers
Obr. 10. Profil v B-B´ linie studovaného území s vyznačením 5. vegetačního stupně